DOCUMENT RESUME

ED 270 095 IR 012 113

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TITLE The Instrument of the Future: Computers in Education.
PUB DATE [85]
NOTE 13p.
PUB TYPE Viewpoints (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Literacy; *Computer Software; Computer Uses in Education; Elementary Secondary Education; Futures (of Society); Instructional Innovation; *Microcomputers; *Skill Development; *Teacher Education; Technological Advancement
IDENTIFIERS *Software Evaluation

ABSTRACT

Before computers will be able to fulfill their potential in education, two major challenges must be overcome--the lack of well-trained teachers and a lack of general knowledge about software and its capabilities. Teachers must acquire some computer literacy skills, including programming, word processing, materials generation and record keeping. In addition, they must be informed of microcomputer applications that are more specific to their discipline and how to integrate these applications into actual lessons. Ability to evaluate software programs is also important; and teachers should look for features that characterize good software, e.g., creativity, instructional objectives, content relevancy and appropriate grade level, screen formatting, adequate instructions, "user friendliness," feedback capabilities, motivational devices, technical quality, good documentation, and teacher utility. Software reviewing sources teachers can use include "The Educational Software Selector," "The Yellow Book of Computer Products for Education," and "The Survey of Early Childhood Software." Teachers training programs should produce educators with enough skills to use the microcomputer as a tool for instructional management, teaching, and classroom management. If educators are to prepare their charges for a place in society, then computers must be given a new place in the schools. Seven steps in evaluating software are listed as well as four references. (JB)

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The Instrument of the Future: Computers in Education

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The Instrument of the Future: Computers in Education

In 1977, interest in computer education surged among some educators with the appearance of microcomputers. The comparative low cost, portability, ease of use, and the general-purpose nature of these machines excited a wide range of educators. Since that time both elementary and secondary schools have acquired large numbers of microcomputers.

The impact of the microcomputer on education paralleled its impact on society. Seymour Papert at the 1977 Congressional Hearings made the following prediction:

> During the nineteen eighties, small but immensely powerful personal computers will become as much a part of everyone's life as the TV, the telephone, the printed paper, and the notebook. Indeed, computers will integrate and supersede the functions of these and other communicational and recreational home technologies. (Papert, 1977)

This prediction has proven true and computers have become a deeply entrenched component of society. While educators are still arguing the pros and cons of computers, the world is being run by computers. Conservative employment projections indicate that within 15 years, over 80 percent of the workforce will be involved in the information industry (Agee, 1985).

Christine Doerr (1979) cites reasons why microcomputers are making such a tremendous impact on education: (1) Opportunities for relevant education - a goal educators have been struggling with for decades and having mixed success; (2) Most jobs of the future will involve computer technology in one way or another and the vocational aspect of computer education cannot be overlooked; (3) Rather than supplanting the teacher's efforts, the computer can create a powerful new teaching force surpassing anything yet achieved in education; (4) Virtually instantaneous feedback continues to be a distinct advantage; and (5) Now students can have creative daily individualized instruction programs that educators have espoused for years.

In spite of the substantial impact being made, results from a recent National Education Association survey indicates that a large majority of teachers are not prepared to meet the challenge of using microcomputers effectively (Norman, 1983). These findings are consistent with the notion that one of the most critical problems facing the effective use of microcomputers in learning is in the area of teacher education. School districts have computers going unused because of lack of teacher training. Yet, for the first time in history, students often know more about the subject than teachers and administrators.

Further integration of computers into the schools poses substantial problems. Technological training for teachers

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and students brings new challenges for the educational community. The computer will never be as simple to operate as the host of household appliances or audiovisual machines in the schools. The purchasing of sufficient hardware and the software to operate that equipment requires vast outlays of money. How to purchase software wisely seems to be a course in itself.

Before computers will be able to fulfill their potential in education, educators face two major challenges, the lack of well trained teachers and a lack of general knowledge about software and its capabilities.

Teacher Training

The teacher is the key to the ultimate success of computers in classrooms. Teacher training programs have a substantial role in the success of computers in education. Teachers must acquire some general knowledge about microcomputers and their uses, such as programming, word processing, materials generation, and record keeping. In addition they must also be informed of microcomputer applications that are more specific to their discipline and how to integrate these applications into actual lessons.

More school districts are acquiring equipment and offering computer training programs. Teacher training programs are waking up and requiring computer skills as a part of the teaching degree. Since 1982 a number of states have been strongly endorsing both the preservice and

in-service training of teachers in the applications of computers to instruction. Consequently, the situation is changing rapidly. Implementation of a program to impart computing skills for typical teachers should contain instructional blocks devoted to the general topics of instructional management, educational software evaluation, and classroom management.

Just a modest use of the computer for companion tasks associated with classroom and instructional management will free the teacher from much tedium. Teachers desiring to acquire some computer skill in the area of instructional management should become familiar with the use of contemporary computer software for test analyses along with grade recording and averaging. There are a number of packages available for these purposes that are economical, easy to use, and efficient. Some statistical software has test analyses components and there are many grade book programs available.

The process of classroom management, for most teachers, covers a substantial range of activities. The computer can be invaluable for many of these time consuming tasks through the use of an integrated software package that contains a minimum of word processing, spreadsheet, and data base. Students names, addresses, telephone numbers, relevant standardized test scores, parents names, places of employment, etc. can be easily stored for quick retrieval.

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The spreadsheet is extremely useful for keeping files on diskettes with accounts of hot lunch money, student book purchases, club funds, equipment, etc. Such accounts are easily updated and a timely printout can always be counted on to assuage a concerned inquiry from a parent or the administration. Word processing skill is invaluable for creating and storing tests, handouts, letters to parents, etc. These items can be stored from year to year and readily recalled for revision. A striking type of printer will accept ditto masters so that materials can go directly from the computer to the duplicating machine.

The foregoing skills can be taught to any teacher with an interest in learning. Moreover, it is not necessary to become a programmer. Indeed it is possible for a teacher to do these things without ever realizing the language in which the software packages are written. It takes only a modest amount of determination, patience, and willingness to devote some time to the learning process in order to become an extensive computer user.

Software

When first investigating computers, many professionals make the mistake of concentrating on hardware and overlooking the fact that in the long run their major investment will be software. Software is constantly changing and being updated to keep pace with changing technology and competition. Moreover, the body of software

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materials is growing rapidly as educational publishers produce courseware to accompany their textbooks and other curriculum materials. Therefore a knowledge of software is a necessity at every level of the educational establishment.

Educational software evaluation should encompass an awareness of a wide range of products as well as specific courseware suitable for the discipline and level being taught by the teacher. This software can range from simple drill and practice programs to more sophisticated packages that encourage the learner to use creative mental skills.

There are currently hundreds of computer programs being offered for sale to the schools. It is an awesome task to select the best ones for your particular needs unless you have guidelines to go by. The following general features seem to characterize good software:

1. Creativity - Creative programs present the material in unusual ways and often involve the student in experiences not otherwise available.
2. Instructional objectives - Good courseware will include clearly defined instructional objectives and suggested activities for using the package to achieve them.
3. Content - Review carefully the factual content of each program for accuracy. Also, check the instructional content of the program for relevance to the curriculum and to determine whether it is

appropriate at the grade level(s) for which it is being considered.

4. Screen formatting - The screens should have one page of information at a time. Students should be able to control the screen by advancing or returning to any desired page at will.
5. Instructions - Does the program really work the way the instructions indicate it will?
6. Student response - Well designed courseware is "user friendly", making it easier for the student to work through the program.
7. Program response to the student - Positive rewards to correct responses; non-judgemental responses to errors are a few examples for effective interaction between computer and student.
8. Motivational devices - Do not assume that programs are automatically improved by the addition of color, graphics, etc. unless they have instructional value and aid the flow of the program.
9. Technical quality - A program should be technically sound, free of programming errors, and easy to operate in normal use over a long period of time. Courseware that does not operate correctly should be returned to the producer with a letter outlining the problem.

10. Documentation - The quality of the materials accompanying the program can add a great deal to its instructional effectiveness and should be evaluated within the context of the total package.
11. Teacher utility - The program should be easy to use in the classroom and operate with a minimum of teacher intervention. It should bave a good classroom management system that saves the teacher time and effort.

From the authors' own experience in selecting courseware for a university curriculum materials center, some of the following considerations should be made. You must know the exact configuration of the hardware you have and the compatibility of the software with that configuration. Considerations such as available memory, peripherals, and upgrade equipment are crucial to making decisions about software. Most companies will allow schools to preview a program for 30 days, and this statement will most likely be found in their product catalog. According to copyright law, you will be able to make a copy for use and keep the original for archival purposes. If the company will not both provide preview service and a back-up-copy, your best option is to deal with another company who will. Another consideration is curricular fit. The producer or dealer must be reliable to deliver maintenance service and to provide some guidance with regard to sofware operational

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problems. Probably one of the most important considerations in the acquisition of good software is cost. There are innumerable computing journals on the market that both advertise and give software reviews. Also various companies produce current catalogs of software they offer for sale. Three good reviewing sources are:

1. The Educational Software Selector
   EPIE Institute
   P.O. Box 839
   Water Mill, NY 11976

2. The Yellow Book of Computer Products for Education
   NEA Educational Computer Service
   P.O. Box 70267
   Washington, DC 20088

3. The Survey of Early Childhood Software
   (Includes evaluation of 108 programs for children in preschool and kindergarten)
   High Scope Educational Research Foundation
   600 N. River St.
   Ypsilante, MI 48197

After locating a piece of software to preview, the next step is a thorough evaluation of the software. There are definite steps to performing an evaluation of software:

1. Locate a program to review and obtain a preview copy.
2. Read the documentation carefully to see if it states instructional objectives, suggests classroom uses and related activities, and provides all needed instructions.
3. Run the program to get a good feel before you use it in the classroom.
4. Complete your evaluation form.
5. Try the program with students and get their reaction.
6. Pay close attention to whether this courseware represents a valid and creative use of the computer.
7. After the decision to purchase or not to purchase has been made, offer a critical review to the publisher. Our refusal to purchase anything other

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than excellent programs will help to improve the courseware available.

There are many models of evaluation instruments available. Checklists and forms for software evaluation have been developed by the National Council of Teachers of Mathematics, San Mateo County Office of Education, and Scholastic among others. In January 1983, Jones and Vaughan published their book, Evaluation of Educational Software: A Guide to Guides, which compiled a selection of the software review and evaluation forms then available. None of these forms is entirely satisfactory in all situations. It seems to be more feasible for each school district to develop an evaluation form to suit its own particular needs.

Summary

Teacher training programs should produce educators with enough skills to use the microcomputer as a tool for instructional management, teaching, and classroom management. The fear of the machine should be a thing of the past, and an awareness of the software to produce the product desired should make microcomputers not a potential for the future, but a potential for now. If educators are to prepare their charges for a place in society, then computers must be given a place in the schools. For computers in education, the future is now.

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